

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 0 771 980 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
07.05.1997 Bulletin 1997/19

(51) Int. Cl.⁶: F16K 11/078, F16K 27/04

(21) Application number: 96117454.7

(22) Date of filing: 31.10.1996

(84) Designated Contracting States:
CH DE ES FI FR GB IT LI SE

(30) Priority: 03.11.1995 IT UD950218

(71) Applicant: GALATRON S.r.l.
I-46043 Castiglione d/Stiviere (Mantova) (IT)

(72) Inventors:

- Orlandi, Alessio
46043 Castiglione delle Stiviere (MN) (IT)
- Orlandi, Roberto
46043 Castiglione delle Stiviere (MN) (IT)

(74) Representative: Petraz, Gilberto Luigi
GLP S.r.l.
Piazzale Cavedalis 6/2
33100 Udine (IT)

(54) Multipurpose system for cartridge mixing valves

(57) Multipurpose system for cartridge valves to mix hot and cold water which comprises a cartridge body (20) and a plurality of auxiliary elements such as adapters and elements having specialist functions, the cartridge body (20) being completed with a closure

element (22), which includes in its outer surface at least one connecting hollow (34) extending circumferentially, at least one auxiliary element including a portion mating with the connecting hollow (34).

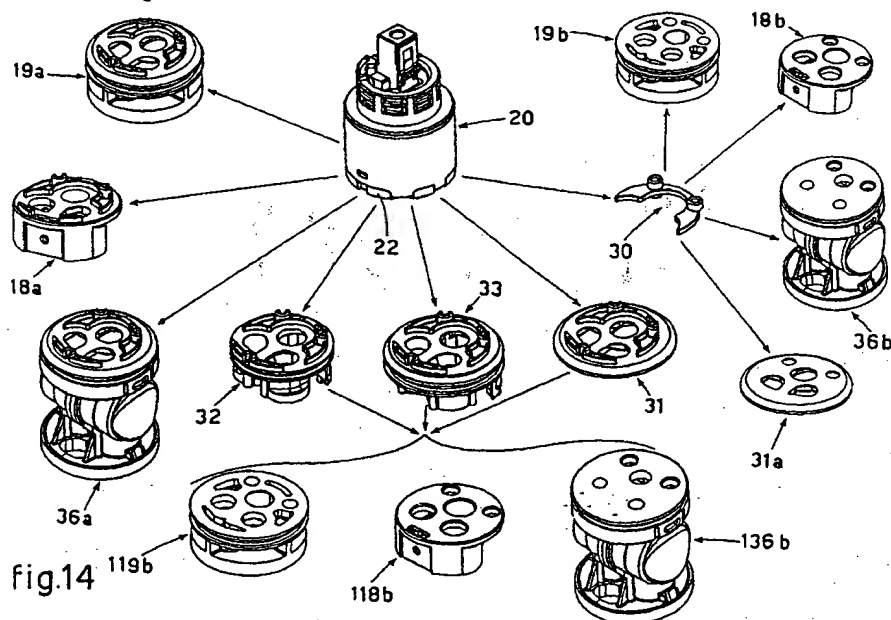


fig.14

EP 0 771 980 A1

Description

This invention concerns a multipurpose system for mixing valves to mix hot and cold water for sanitary apparatuses, as set forth in the main claim.

To be more exact, the invention concerns an integrated system able to widen the suitability for application and the versatility of the cartridge-type mixing valves of a type standardised dimensionally.

These cartridge mixing valves are inserted into a suitable cavity in a tap body, the cavity being located in an intermediate position between the pipes delivering the hot and cold water and an outlet for delivering the mixed water towards the sanitary apparatus.

The cartridge mixing valves of a basic type disclosed in the state of the art include a substantially cylindrical cartridge body which encloses the functional elements intended to control the delivery and closure of the two types of water to be mixed and delivered, this cartridge body being equipped with means for its correct positioning in the tap body.

At the present time, to the basic configuration of two or three sizes having a standardised outer diameter and length there are added as many more different contrivances as there are different requirements and conditions of application of the valves for working.

In actual fact, mixing valves can be found with a bottom including merely two basic feet which, being inserted in corresponding holes in the bottom of the cavity of the tap body in which the valve is to be located, enable the valve to be correctly positioned and oriented.

The sizes and distance between centres of the feet may vary between one producer of valves and another, and therefore it is possible that the valves of one supplier cannot be interchanged with the valves of another supplier.

Next, mixing valves are available with a bottom having an adapter block, and mixing valves are also available with a so-called bottom distributor, both these valves being used under particular conditions.

Moreover, the mixing valves with these special features require feet for their positioning in the tap body.

The mixing valves can also be combined with other means such as a pressure-balancing means, non-return valves, etc., and in this case too the valves have to be pre-arranged for a suitable combination.

In other words, at the present time it is necessary to have ready and available mixing valves, each of which is independently suitable as regards dimensions and equipment for the use in question but substantially without the ability to be converted or adapted according to prevailing requirements.

This situation is such because a "universal" valve is lacking which would be suitable for any installation conditions.

Partial solutions to the problem have been disclosed so that, for instance, by using the outer wall of the cartridge, a terminal replaceable element has been provided which forms also a bottom wall for closing and

positioning the means inside the cartridge.

This solution, besides being conditioned dimensionally (outer diameter), requires great attention and care in replacing the terminal replaceable element so as to prevent all the inner parts losing their pre-set positions applied during their assembly, this too without considering the dangers of breakage and blocking.

An independent adapter element has also been disclosed which is anchored to the completed bottom of the mixing valve, but this disclosure provides a limitation of a dimensional type and of a typological character of the cartridge and therefore does not provide any teaching which leads to an integrated standardised system suitable to meet the problems of specialisation and adaptation of the standardised sizes of mixing valves.

The present applicants have designed, tested and embodied this invention to overcome all the above shortcomings and to achieve further advantages.

This invention is set forth and characterised in the main claim, while the dependent claims describe variants of the idea of the main embodiment.

The purpose of this invention is to overcome the lack of a "universal" valve and therefore to provide for the embodiment of an integrated and versatile system suitable to meet all the requirements of adaptation and specialisation of the various standardised sizes of the cartridges of mixing valves.

The purpose of the invention is therefore to provide a mixing valve which starts "bare" but completed in itself and therefore complete with all the functional parts, including the closure bottom, and which can then be equipped from time to time with complementary elements, whether those elements be adapters or elements performing specialised functions.

This situation provides the advantage that, by providing one single size of mixing valve, it is possible to obtain a "universal" system which can be used in any tap and under any condition of a known type, thus eliminating the need to have to prepare and have available different sizes with different functions.

According to the invention there is provided a standardised size of cartridge mixing valve complete in itself and including an outer bottom surface with standardised anchorage means.

The various adapters and specialised elements which have to be applied to the bottom of the cartridge mixing valve to meet the various requirements of adaptation and/or specialised working include mating means for their combination with the outer surface of the bottom either directly or with the help of an adapter element.

Therefore the bottom wall of the cartridge body of the valve is structured for the application thereto, according to requirements, of any one of the many complementary modular elements such as positioning feet, adapter blocks, distributor elements and other means which, in turn, have been designed for coupling to the bottom wall.

It follows that it is possible to construct and have

available, on the one hand, mixer valves which are all the same and, on the other hand, merely complementary elements, and that each mixing valve can be equipped, even at the moment it is set to work, with any complementary element selected by the person carrying out the installation on the basis of the prevailing requirements.

This idea of the embodiment entails a plurality of advantages.

First of all, it reduces the number of standardised sizes of the cartridges to one single size with the obvious result of savings as regards investments, better use of company resources, smaller consumption of materials and of energy, less space taken up, etc.

Moreover, it reduces stocks and therefore the finances tied up, it simplifies the completion of orders, it reduces mistakes in deliveries, it lowers the costs for the end user and reduces the problems of maintenance and replacement to be borne by the end user.

According to a variant, the invention arranges that the system employs, as a standardised size of the cartridge mixing valve, the smallest standardised size and that through suitable adapter means that size can therefore be located, even as a replacement, in positions provided for larger standardised sizes.

According to the invention the outer surface of the closure element includes standardised coupling means, which mate with the coupling means provided on the connecting surface of the auxiliary elements.

According to the invention a basic adapter element is provided which completes the cartridge body and makes it substantially the same as the present cartridge bodies and also completes the cartridge and makes it ready for use.

According to the invention, moreover, this basic adapter element is used to connect auxiliary elements of the state of the art of a standardised type and produced at the present time for coupling to cartridge bodies of a traditional type.

By means of this contrivance the system is usable both for specifically designed auxiliary elements and for auxiliary elements of a traditional and standardised type already on the market.

The attached figures are given as a non-restrictive example and show a preferred embodiment of the invention as follows:-

- Fig.1 shows a cartridge mixing valve complete in itself according to the invention;
- Fig.2 shows the surface, for connection to the cartridge, of the element that closes the bottom of the cartridge of Fig.1;
- Fig.3 shows the basic adapter element which can be applied to the outer surface of the mixing valve of Fig.1;
- Fig.4 shows the surface, for connection

Fig.5

5

Fig.6

Fig.7

10

Figs.7a, 7b and 7c

15 Fig.8

Fig.8a

20

Fig.9

25 Figs.9a, 9b and 9c

Fig.10

30

Fig.11

35 Fig.11a

Fig.12

40 Fig.13

Fig.14

45

to the cartridge of Fig.1, of the adapter element;

shows the surface, for connection to the cartridge of Fig.1, of a first distributor element;

shows the surface, for connection to the cartridge of Fig.1, of a second distributor of a greater type;

shows only the bottom wall as seen from the inside of the mixing valve;

show respectively plan views of the inside, side and outside of the bottom wall of Fig.7;

shows a three-dimensional view of the bottom wall and the basic adapter element in line with each other for coupling;

is a three-dimensional view of the bottom wall and the basic adapter element when coupled;

is a three-dimensional view of the adapter element of Fig.4 from the outside;

show respectively plan views of the inside, side and outside of the adapter element of Fig.9;

is a three-dimensional view of the closure element of Fig.2 and the adapter element of Fig.4 in line for coupling;

is a three-dimensional view of the mixing valve of Fig.1 completed with the adapter element of Fig.4;

is a cutaway longitudinal view of the mixing valve of Fig.11;

shows the first distributor element of Fig.5 in a three-dimensional view from the outside;

is a three-dimensional view of the closure element of Fig.2 and the first distributor element of Fig.5 in line for coupling together;

shows a working diagram of the system according to the invention.

The reference number 20 in the attached figures denotes overall a cartridge body complete in itself and therefore including also a closure element 22 of a mixing valve having standardised measurements on the basis of market standards, these standardised measurements being those of the smallest cartridge.

At the present time the diameter of the smallest cartridge normally produced for the market is 35 mm., and this measurement is in the present embodiment of the invention the standardised diameter of the cartridge 20.

It is clear that according to a variant the invention can be applied also to standardised cartridges having a

diameter selected from the standardised diameters on the market according to the choice of the user or producer.

The cartridge body 20 consists of a bell-shaped element 21 closed with a bottom wall or closure element 22.

Valve means are provided in the cartridge body 20 (Fig. 11a) and consist of two small superimposed plates 23, 24 consisting, for instance, of a ceramic material or the like, of which a lower plate 23 is stationary and an upper movable plate 24 is rested on the stationary plate 23 and is connected to and can be moved by an operating lever 25 equipped with an engagement handle, which is not shown here.

In this case, the bell-shaped element 21 and the bottom wall, or closure element 22, are connected to each other to form together the cartridge body 20 and to retain the inner working elements.

Two holes 26, 27 for the entry of hot water and cold water respectively and a hole 28 for the exit of the mixed water are included in the bottom wall 22.

The holes 26, 27, 28 for the entry and exit of the water are surrounded by or contain sealing packings 29 and are intended to communicate with pipes delivering the hot and cold water and with an outlet for delivery of the water for use.

It should be noted that in the state of the art the various sizes or measurements of the standardised cartridges 20 have a different closure element 22 with seatings for the bottom sealing packings 29 having different conformations and contacting each other.

According to this invention the outer surface of the closure element 22 including the organised seat or seats of the sealing packings 29 is so structured as to be easily coupled and disconnected to or from any of the complementary elements which are used to achieve the necessary adaptations or, or also, so as to allow the mixing valve to perform also specialised tasks.

An example of the possible composition of the system which can be achieved with the invention is shown in Fig. 14.

This Fig. 14 shows some elements according to the invention such as a pressure regulator 36a, a vacuum breaker 18a and a back-to-back means 19a, which can be coupled directly to the closure element 22, and shows also the same elements 36b, 18b and 19b (and 136b, 118b and 119b of a larger size) as normally available on the market and having a standardised conformation.

These elements 36b, 18b and 19b, 136b, 118b and 119b and other analogous elements having different specialised functions can be coupled, owing to the adapters 30, 31 provided by this invention, to the cartridge body 20 so as to form the multipurpose system according to the invention.

The auxiliary elements which can be applied as desired are at least a basic adapter element 30, an adapter element 31 of greater size, a first distributor element 32, a second distributor element 33, the back-to-

back means 19, a pressure regulator 36, a vacuum breaker 18, a thermostat regulator (not shown), etc.

The closure element 22 in the embodiment shown as an example includes on its outer surface a connecting hollow 34 which may, or may not, include at least a reference recess 34'.

This connecting hollow 34 extends circumferentially on the closure element 22 in a manner sufficient to create a stable connection in relation to all the axes passing through the plane of its positioning.

According to an equivalent variant, instead of one single connecting hollow 34 there may be included two or even more connecting hollows arranged in a manner coordinated with the position which the attachment feet have to take up.

According to the invention a positioner hollow 35 with a possible reference recess 35' may also be included.

The connecting hollow 34 and possibly also the positioner hollow 35 receive either the basic adapter 30 or the coordinated connecting means included in the coupling surface of the auxiliary elements already provided, such as the elements 36a, 18a, 19a, etc.

The basic adapter element 30 completes the cartridge body 20 and conforms it like a normal mixing valve ready for use since it provides below the cartridge body 20 the attachment feet 15 required for the correct positioning of the cartridge body 20 within a tap.

As we said above, the basic adapter element 30 has the purpose also of connecting auxiliary elements of the state of the art, which are of a standardised type and are therefore not purposely conformed.

The basic adapter element 30 with the attachment feet 15 is in the form of a plate dimensioned so that it can be inserted in a mating manner in the connecting hollow 34 and can be contained therein substantially at the level of the lower edge of the closure element 22 of the cartridge body 20, except for the attachment feet 15, which protrude downwards.

The basic adapter element 30 can include on its upper side coupling pins 16, which are engaged in the possible reference recesses 34' of the connecting hollow 34 (see Figs. 8 and 8a).

The basic adapter element 30 is thus constrained in the closure element 22 of the cartridge body 20 in relation to all the axes passing through the plane of positioning and enables the cartridge body 20 to be equipped on its lower side with two positioning attachment feet 15 for its emplacement at work in a tap body.

It should be noted that the sizes of the attachment feet 15 and the distance between their centres can be selected as desired, thus enabling the mixing valve to be employed under all conditions.

An adapter element 31 of a greater size can also be applied to the closure element 22 of the mixing valve; this greater adapter element 31 can assist in lengthening the height of the cartridge body 20 or can, or also can, make suitable the outer diameter of the cartridge body 20 for a greater diameter (see Fig. 4).

The greater adapter element 31 contains holes 31a, 31b, 31c coinciding with the holes 26, 27, 28 in the closure element 22 and surrounded by packings, which are not shown here.

In this case, the greater adapter element 31 (see Fig.4) includes in one face some walls 17 and pins 16 intended for insertion respectively in the connecting hollow 34 and positioner hollow 35 and in the recesses 34', 35' of the closure element 22, as shown in Figs.9a, 9b and 10.

The greater adapter element 31 thus remains constrained in the cartridge body 20 to perform the function provided therefor.

According to a variant, the greater adapter element 31a is substantially flat on its upper side and requires the basic adapter element 30 for its connection to the cartridge body 20.

The greater adapter element 31 according to the invention on its surface opposite to that of its connection to the cartridge body 20, namely on its lower surface, includes two attachment feet 15 so as to define together with the cartridge body 20 a cartridge complete in itself and ready for positioning in the tap body.

According to a variant a connecting hollow 34 is included in that lower surface and is suitable to lodge the basic adapter element 30.

To the closure element 22 of the mixing valve in the system according to the invention there can be applied also the first distributor element 32 or the second distributor element 33, these distributor elements differing from each other essentially in their diameter; the first distributor element 32 has a diameter equal to that of the cartridge body 20, whereas the second distributor element 33 has a greater diameter; both distributor elements 32, 33 include a peripheral groove to lodge a packing.

The first and second distributor elements 32, 33 act as a mixing chamber and are used in valves which do not include this function.

The first distributor element 32 contains passages 32a, 32b, 32c coinciding with holes 26, 27, 28 contained in the closure element 22, all these passages or some of them being surrounded by packings, which are not shown here.

The first distributor element 32 includes on its upper surface some walls 17 and pins 16 intended for insertion respectively in the connecting hollow 34 and positioner hollow 35 and in the recesses 34', 35' of the closure element 22 or greater adapter element 31.

The first distributor element 32 contains also, on its surface opposite to that connected to the cartridge body 20, namely on its lower surface, positioning feet 15 for the correct arrangement of the mixing valve, complete with the first distributor element 32, in the body of a tap.

The second distributor element 33 too contains passages 33a, 33b, 33c coinciding with the holes 26, 27, 28 contained in the closure element 22 of the mixing valve, all or some of these passages being surrounded by packings, which are not shown here.

The second distributor element 33 too has walls 17 and pins 16 on one of its surfaces, namely its upper surface.

The second distributor element 33 has on its opposite surface positioning feet 15 for the correct arrangement of the mixing valve, complete with that second distributor element 33, in the body of a tap.

Fig.14 shows how the system embodied according to the invention is very versatile and provides great advantages for everybody.

Fig.14 shows some possible applications so that the basic adapter element 30 and/or the greater adapter element 31 can in themselves complete the cartridge body 20 or can act as means to connect the cartridge body 20 to auxiliary elements such as distributor elements 32, 33, back-to-back means 19, pressure regulators 36, temperature regulators, vacuum breakers 18, etc.

It is possible to see, in particular, how the cartridge body 20 can be coupled to elements having specialised functions 36a, 18a, 19a and personalised with walls 17 and pins 16, or with analogous standardised elements 36b, 18b and 19b by using the adapter elements 30, 31.

Moreover, while the basic adapter element 30 makes possible the coupling of elements 36b, 18b and 19b of a smaller size, the use of the greater adapter element 31 makes possible the coupling of elements 136b, 118b and 119b of a greater size.

The greater adapter element 31 can be personalised with walls 17 or pins 16 or can be standardised 31a and can cooperate in turn with a basic adapter element 30.

The first 32 and second 33 distributor elements too can in turn act for the connection of elements having specialised functions 36b, 18b and 19b of a standardised type.

According to a further variant, which is not shown here, the first 32 and second 33 distributor elements too may need the basic adapter element 30 or greater adapter element 31 for their coupling to the cartridge body 20.

It is therefore clear that the body of the mixing valve on each occasion can be equipped and therefore personalised with one or more auxiliary elements which characterise that body and adapt it to a specific installation requirement.

By starting with a basic valve and by having available only auxiliary elements complete in themselves it is possible to equip mixing valves with functions for particular purposes suitable for the desired conditions of use.

Claims

1. Multipurpose system for cartridge valves to mix hot and cold water which comprises a cartridge body (20) and a plurality of auxiliary elements such as adapters and elements having specialist functions, the system being characterised in that the cartridge body (20) is completed with a closure element (22),

- which includes in its outer surface at least one connecting hollow (34) extending circumferentially, at least one auxiliary element including a portion mating with that connecting hollow (34)..
2. Multipurpose system as in Claim 1, in which the completed cartridge body (20) has the geometric dimensions of the smaller standardised cartridge, for instance a diameter of 35 mm.
 3. Multipurpose system as in Claim 1, in which the completed cartridge body (20) has preferred geometric dimensions.
 4. Multipurpose system as in any claim hereinbefore, in which the auxiliary element is at least one basic adapter element (30) conformed so as to mate with the connecting hollow (34) and including attachment feet (15), the basic adapter element (30) in its installed position being contained in the connecting hollow (34) and completing the cartridge in itself.
 5. Multipurpose system as in Claims 1 and 4, in which the basic adapter element (30) in its installed position lies substantially at the level of the lower edge of the closure element (22) of the cartridge body (20), the attachment feet (15) alone extending below.
 6. Multipurpose system as in any claim hereinbefore, in which the auxiliary element is at least one greater adapter element (31) with a supporting base and attachment feet (15), the greater adapter element (31) completing the cartridge in itself.
 7. Multipurpose system as in any claim hereinbefore, in which the auxiliary element is at least one distributor element (32, 33) with relative attachment feet (15).
 8. Multipurpose system as in any claim hereinbefore, in which the auxiliary element is at least one element having specialist functions such as a back-to-back means (19), a pressure regulator (36), a temperature regulator, a vacuum breaker (18) or another means equipped on its lower side with possible attachment feet (15).
 9. Multipurpose system as in any of Claims 1 to 7 inclusive, in which the auxiliary elements, adapters, distributors and/or means with specialist functions and of a standardised type can be applied to the cartridge body (20) with the basic adapter element (30) fitted to that body (20).
 10. Multipurpose system as in any of Claims 1 to 8 inclusive, in which the auxiliary elements, adapters, distributors and/or means with specialist functions and of a standardised type can be applied to the cartridge body (20) with the greater adapter element (31) fitted to that body (20).
 11. Multipurpose system as in any claim hereinbefore, in which the bottom of the closure element (22) of the cartridge body (20) contains a positioner hollow (35).
 12. Multipurpose system as in Claim 11, in which at least one auxiliary element has a form mating with the positioner hollow (35).
 13. Multipurpose system as in any claim hereinbefore, in which the connecting hollow (34) contains at least one reference recess (34').
 14. Multipurpose system as in any claim hereinbefore, in which the positioner hollow (35) contains at least one reference recess (35').
 15. Multipurpose system as in Claim 13, in which the auxiliary element which has a form mating with the connecting hollow (34) includes pins (16) mating with the reference recess (34').
 16. Multipurpose system as in Claim 14, in which the auxiliary element which has a form mating with the positioner hollow (35) includes pins (16) mating with the reference recess (35').
 17. Multipurpose system as in any claim hereinbefore, in which the cartridge body (20) includes at least one bell-shaped element (21) closed by a bottom wall (22) containing at least two inlets (26, 27) for hot and cold water respectively and an outlet (28) for the water to be used.
 18. Multipurpose system as in any claim hereinbefore, in which the basic adapter element (30) consists of at least one plate which can be coupled to the closure element (22) of the cartridge body (20) and which includes attachment feet (15) in its lower surface and possible coupling pins (16) in its upper surface.
 19. Multipurpose system as in any claim hereinbefore, in which the greater adapter element (31) consists of a substantially circular plate which can be coupled to the closure element (22) of the cartridge body (20) and which includes at least coupling pins (16) and walls (17) in its upper surface and attachment feet (15) in its lower surface.
 20. Multipurpose system as in Claim 19, in which the greater adapter element (31) includes in its lower surface a connecting hollow (34) able to accept the basic adapter element (30).
 21. Multipurpose system as in any claim hereinbefore,

in which the first distributor element (32) has a diameter substantially equal to that of the cartridge body (20) and includes coupling pins (16) and walls (17) in its upper surface and attachment feet (15) in its lower surface.

5

22. Multipurpose system as in any claim hereinbefore, in which the second distributor element (33) has a diameter greater than that of the cartridge body (20) and includes coupling pins (16) and walls (17) in its upper surface and attachment feet (15) in its lower surface.

10

15

20

25

30

35

40

45

50

55

7

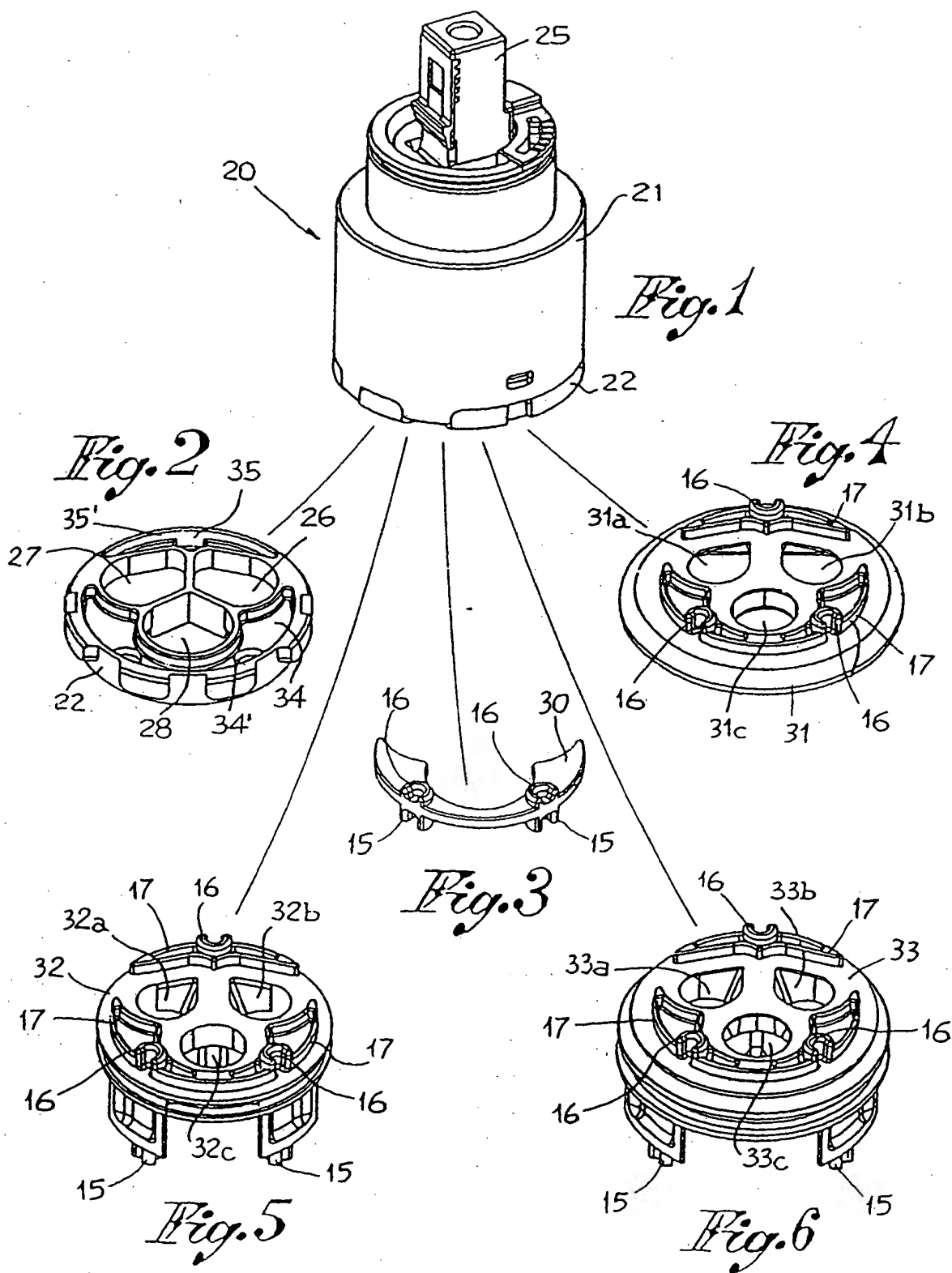


Fig. 7a

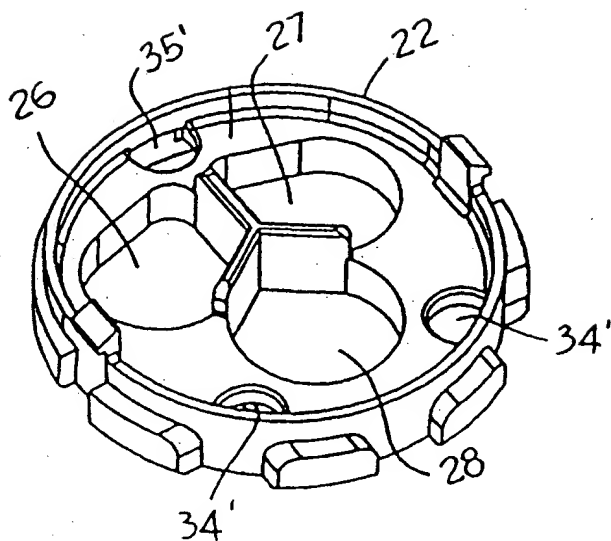
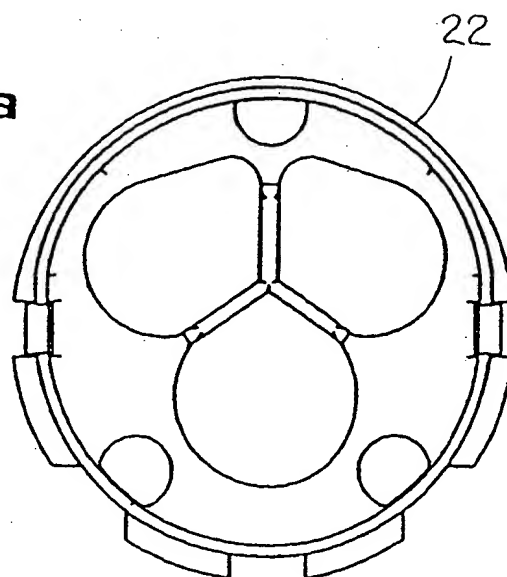


Fig. 7b

Fig. 7

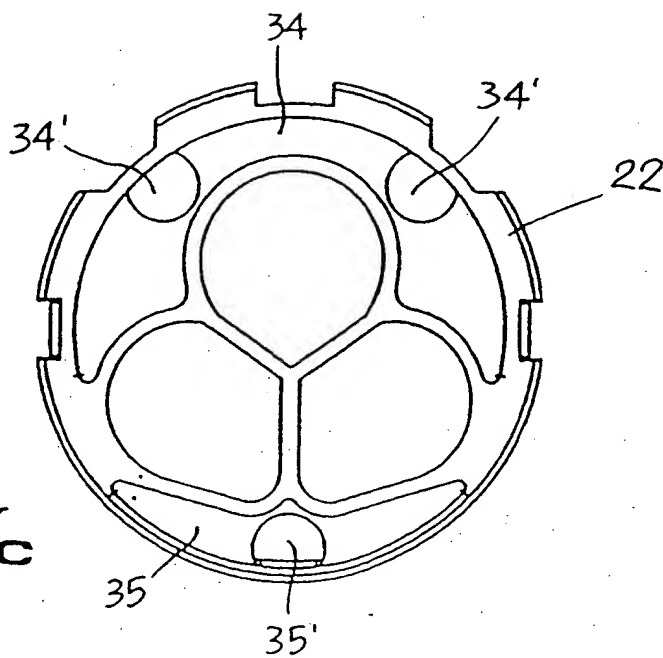


Fig. 7c

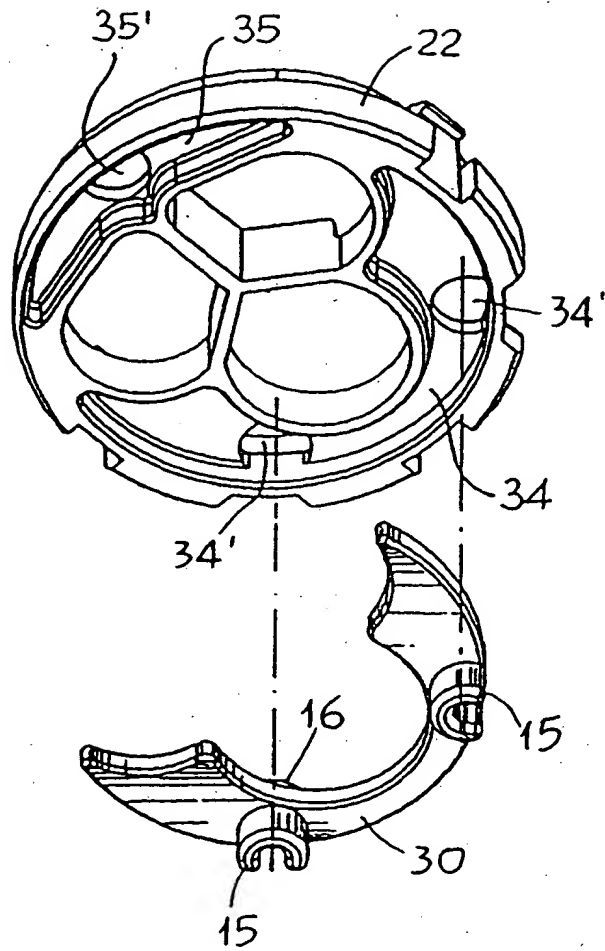
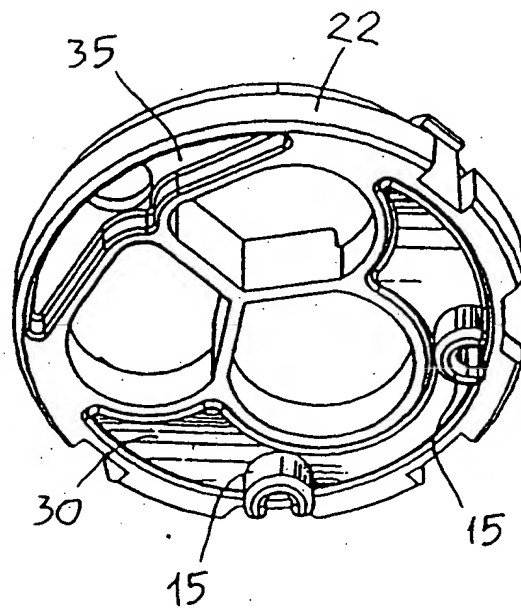


Fig. 8

Fig. 8a



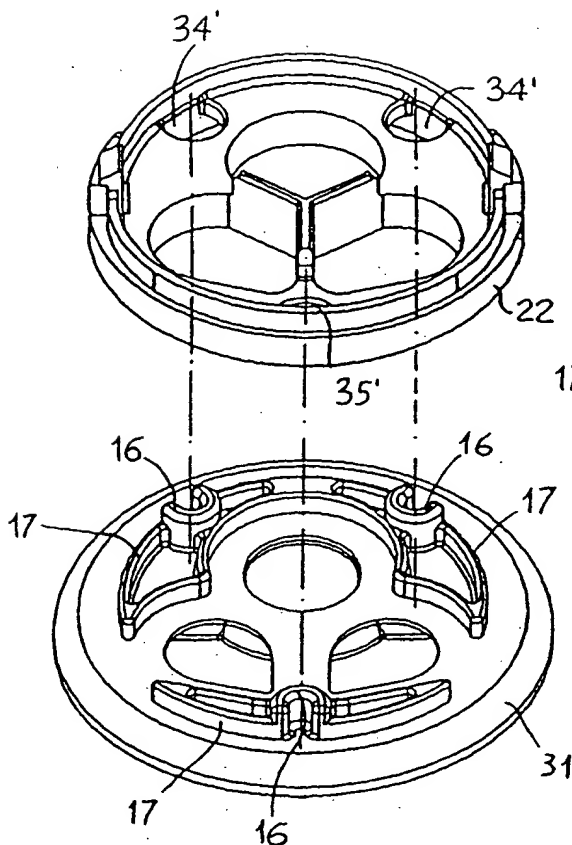


Fig. 10

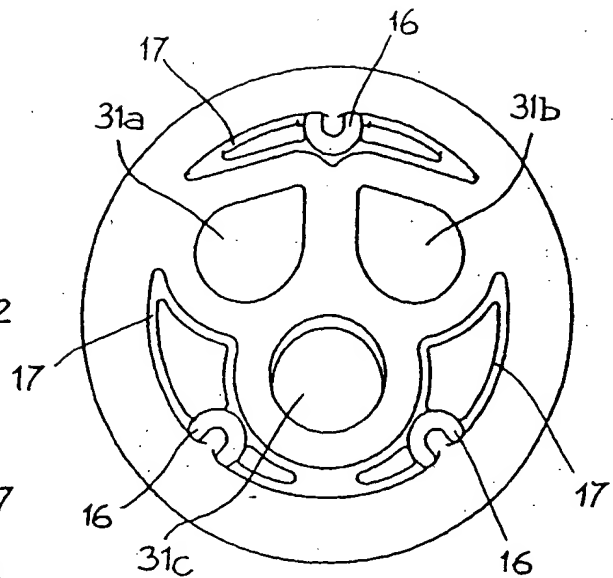


Fig. 9a

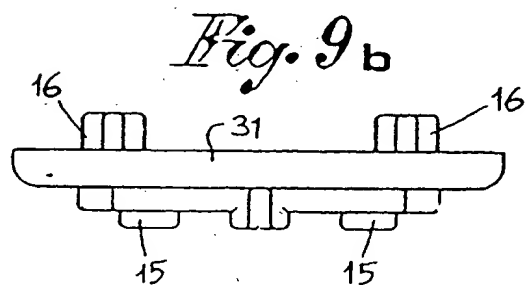


Fig. 9b

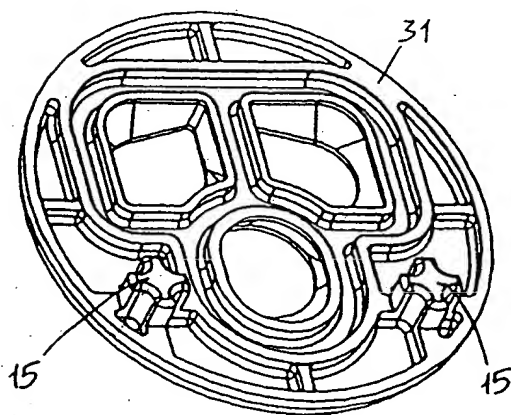


Fig. 9

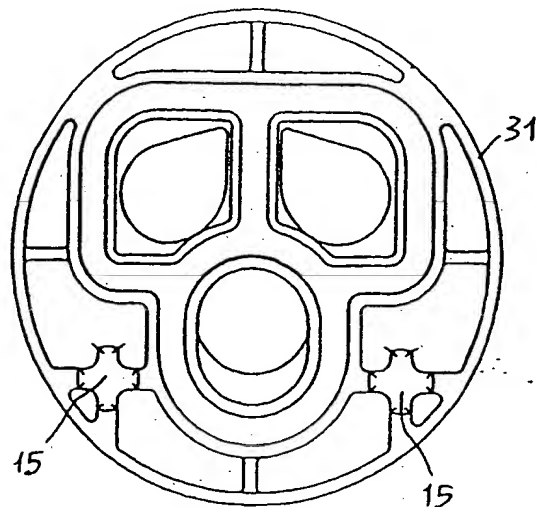


Fig. 9c

Fig. 11a

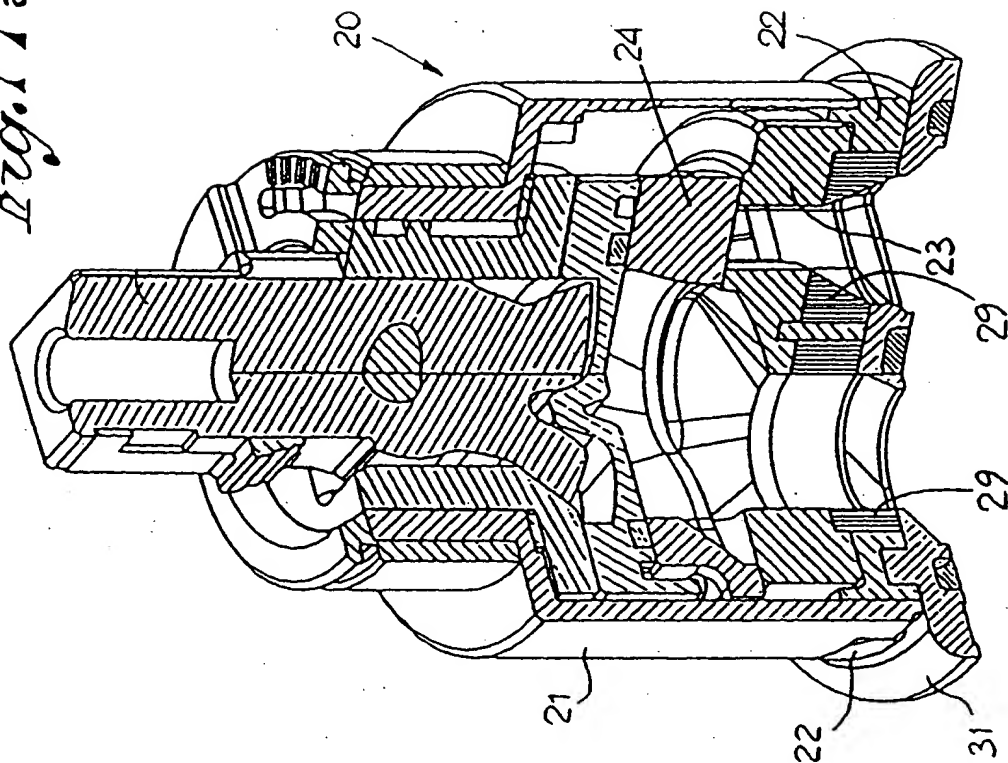


Fig. 11

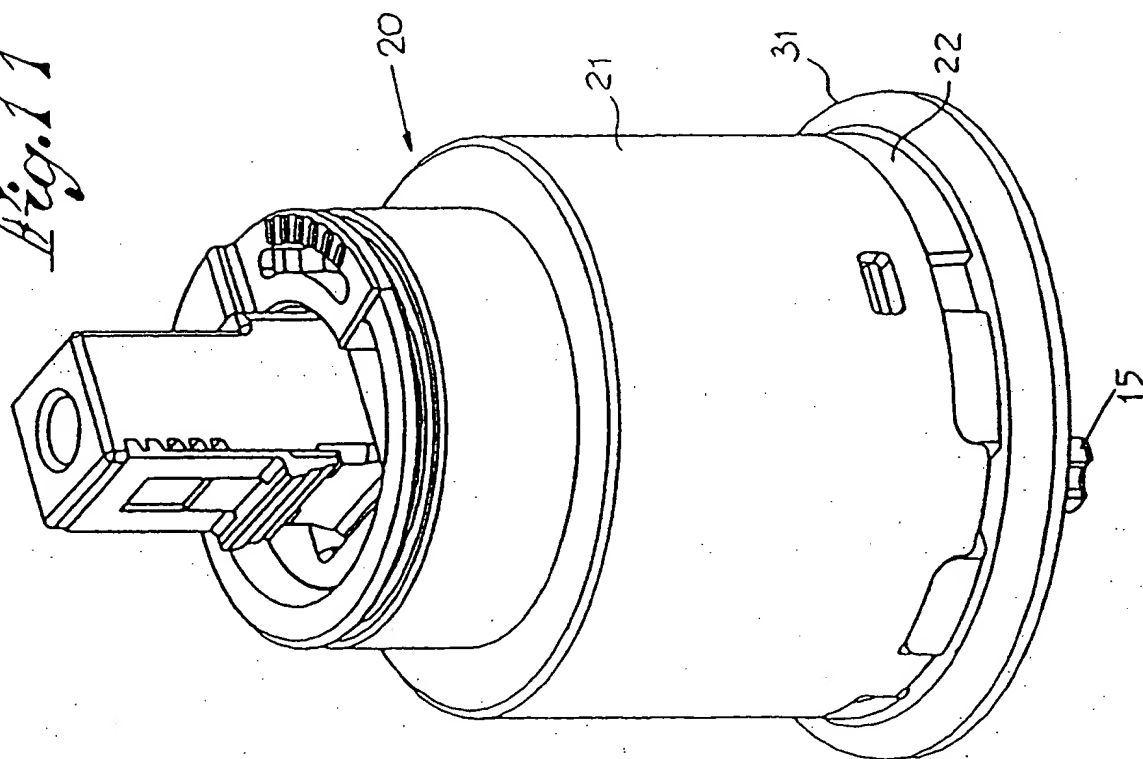


Fig. 12

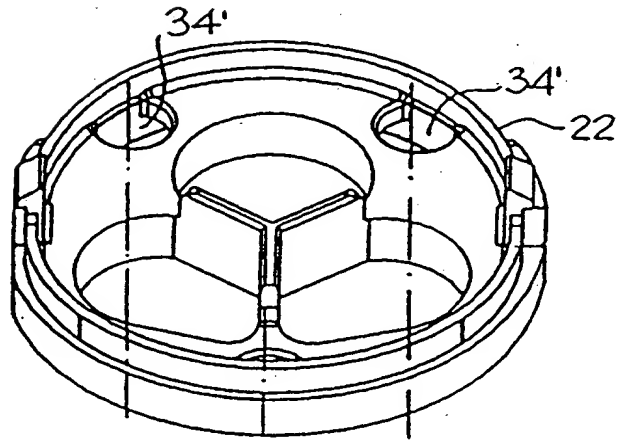
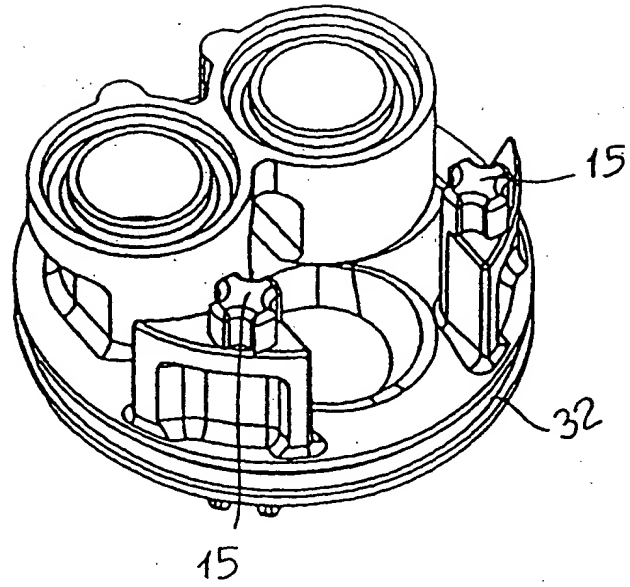
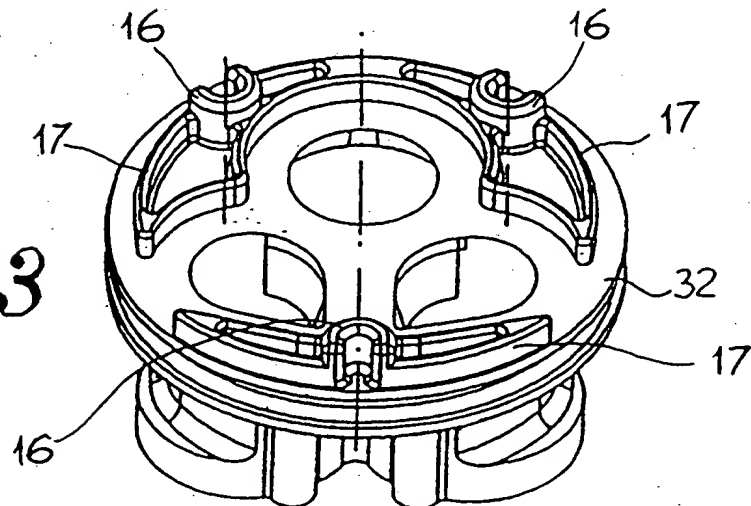


Fig. 13



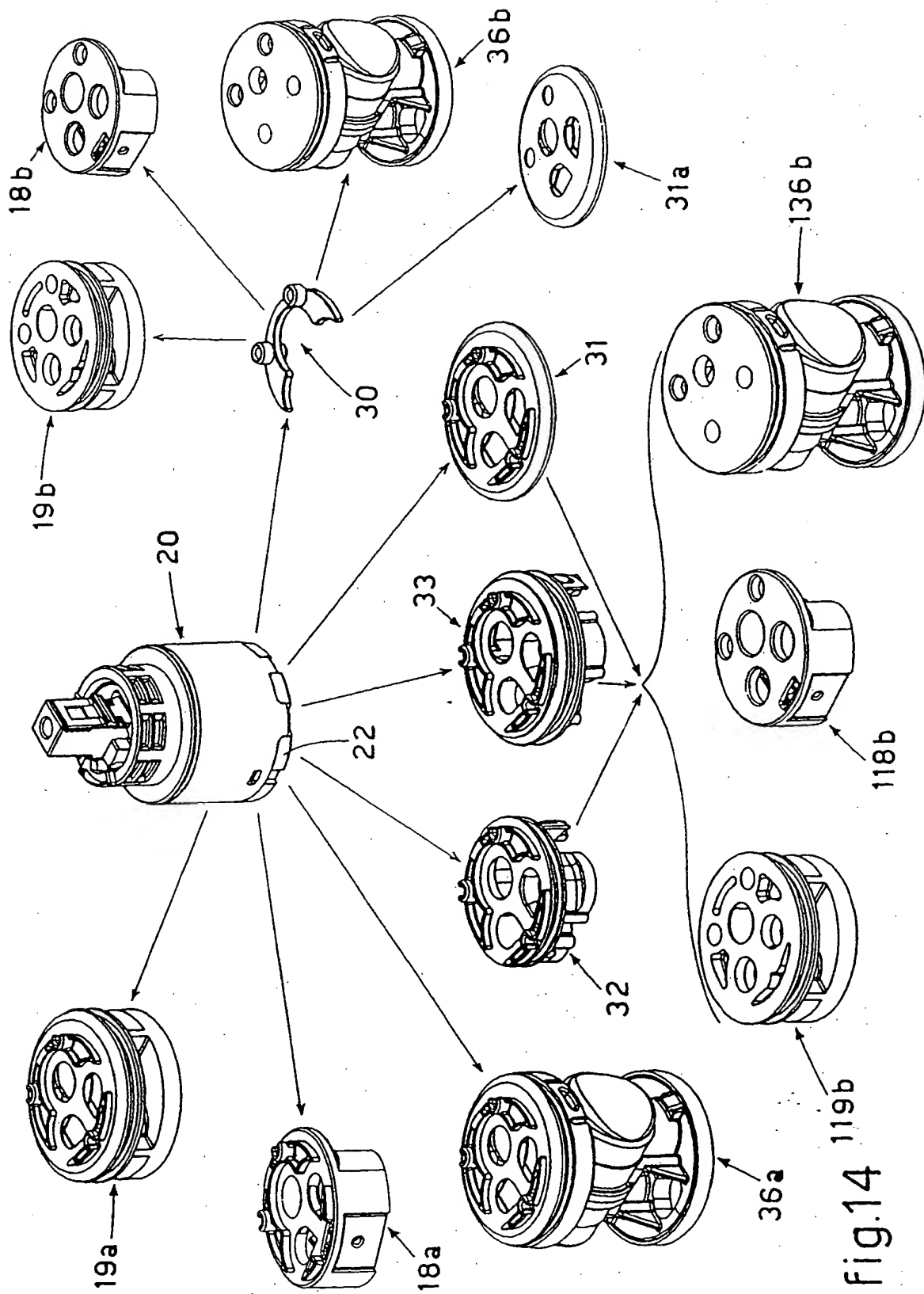


Fig.14



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 11 7454

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|--|--|---|--|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
| X | EP 0 555 615 A (GIRADINI) * column 3, line 25 - line 49; figures * | 1-4 | F16K11/078 F16K27/04 |
| A | EP 0 571 768 A (AMFAG S.R.L.) * column 4, line 47 - column 5, line 39; figures 1-5 * | 1 | |
| A | FR 2 570 792 A (HD EICHELBERG & CO. GMBH) * page 2, line 32 - page 3, line 23; figures * | 1 | |
| A | DE 32 11 619 A (HEINRICH SCHULTE & SOHN) * page 5, line 31 - page 6, line 17; figure 1 * | 1 | |
| A | DE 85 20 276 U (IDEAL STANDARD GMBH) * page 4 - page 5, paragraph 2 * | 1 | |
| | | | TECHNICAL FIELDS SEARCHED (Int.Cl.6) |
| | | | F16K |
| The present search report has been drawn up for all claims | | | |
| Place of search THE HAGUE | | Date of completion of the search 6 February 1997 | Examiner Christensen, J |
| CATEGORY OF CITED DOCUMENTS | | | |
| X : particularly relevant if taken alone Y : particularly relevant if taken with another document of the same category A : technological background O : non-written disclosure P : intermediate document | | T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document | |

EPO FORM 1503 03.92 (F04C01)